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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appln. No:	10/595,081
Applicant:	Tomohisa Tenra
Filed:	February 1, 2006
Title:	VACUUM HEAT INSULATOR, MANUFACTURING METHOD OF THE SAME, HOT-INSULATION COLD INSULATION APPARATUS HAVING THE SAME, AND HEAT INSULATION BOARD
T.C./A.U.:	1794
Examiner:	Alexander S. Thomas
Confirmation No.:	2252
Docket No.:	MAT-8798US

AMENDMENT UNDER 37 C.F.R. § 1.116

Expedited Procedure

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the Final Office Action dated **November 18, 2008**, please amend the above-identified application as follows:

☒ **Amendments to the Specification** begin on page 2 of this paper.

☒ **Amendments to the Claims** are reflected in the listing of claims which begins on page 4 of this paper.

☐ **Amendments to the Drawings** begin on page of this paper and include an attached replacement sheet(s).

☐ **Amendments to the Abstract** are on page of this paper. A clean version of the Abstract is on page of this paper.

☒ **Remarks/Arguments** begin on page 7 of this paper.

Amendments to the Specification:

Please replace the paragraph, beginning at page 6, line 10, with the following rewritten paragraph:

At this time, as the glass fibers, C glass of which alkali content is 17 wt% is used. When the viscosity temperature characteristics of the glass are analyzed by a beam bending method, the temperature of the ~~distortion~~ strain point is 525°C. C glass means glass of which alkali content is at least 0.8 wt% and at most 20 wt%, and especially glass for fiber having high acid resistance

Please replace Table 1, beginning at page 10, with the following rewritten Table:

Table 1

No.	Glass		Characteristic of core				Characteristic of vacuum heat insulator	
	Type	~~Distortion~~ Strain point (°C)	Binding material	Density (kg/m^3)	Surface hardness	Handling property	Heat conductivity (W/mK)	Density of core (kg/m^3)
E1	C	525	Non	200	50	good	0.0020	235
E2	C	525	Non	220	51	good	0.0019	240
E3	C	525	Non	240	52	good	0.0018	260
E4	C	525	Non	260	52	good	0.0020	270
E5	A	500	Non	220	52	good	0.0020	240
E6	C	525	Colloidal silica	200	55	excellent	0.0024	230
C1	C	525	Eluting component	220	51	good	0.0027	240
C2	C	525	Water glass	220	55	good	0.0030	240
C3	C	525	Boric acid	220	50	good	0.0029	240
C4	E	560	Non	180	20	bad	0.0020	240

Please replace the paragraph, beginning at page 11, line 6, with the following rewritten paragraph:

On the other hand, the vacuum heat insulators in samples E1 to E5 using no binding material have heat conductivity of ~~0.018~~.0018 to 0.002 W/mK at average

temperature of 24°C, and have heat insulation performance that is 10 or more times higher than that of the general-purpose rigid polyurethane foam. Further, since the binder component is not used, gas generated from the binder component does not occur, and vacuum heat insulators having small degradation over time in heat insulation performance can be provided. Since the binder component is not required in molding the cores, man-hour can be reduced and the cores can be molded efficiently.

Please replace the paragraph, beginning at page 11, line 19, with the following rewritten paragraph:

In sample C4, E glass of high ~~distortion~~ strain point is used, but the core is molded at 480°C which is the same as that for C glass. Therefore, the heat deformation of the glass fibers is insufficient, core rigidity is insufficient, and the handling property of the core presents a problem. Though the core is molded to have the density of 220 kg/m^3 thereof, the laminated body of the glass fibers cannot be molded in a predetermined thickness and hence the density after the molding is 180 kg/m^3. Thus, it is preferable to use the glass containing alkali in core 2, because the molding temperature is low.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Previously Presented) A vacuum heat insulator comprising:

a core formed of a laminated body where glass fibers are laminated in a thickness direction of the vacuum heat insulator; and

an enveloping member covering the core and having gas barrier property,

wherein the core is pressurized and molded and the glass fibers are drawn by heat deformation of the glass fibers at one of the following temperatures which are lower than the strain point of the glass fibers:

a temperature at which the glass fibers start to deform due to own weight of the glass fibers; and

a temperature at which the glass fibers become deformable due to a vertical load in pressing and sectional shapes of the glass fibers do not significantly vary, and

a shape of the core is kept by entanglement of parts of the glass fibers instead of binding of the glass fibers; and

wherein the vacuum heat insulator has a heat conductivity less than or equal to 0.0020 W/mK.

2. (Original) The vacuum heat insulator according to claim 1, wherein glass wool is used as the glass fibers.

3. (Original) The vacuum heat insulator according to claim 1, wherein the core is free from binding material for binding the glass fibers.

4. (Cancelled).

5. (Original) The vacuum heat insulator according to claim 1, wherein density of the core is at least 100 kg/m^3 and at most 400 kg/m^3.

6. (Original) The vacuum heat insulator according to claim 1, wherein the core plastically deforms in a density of at least 100 kg/m^3 and at most 400 kg/m^3.

7. (Previously Presented) The vacuum heat insulator according to claim 1, wherein the core has a smooth surface layer on at least one-side surface in a lamination direction of the laminated body.

8. (Original) The vacuum heat insulator according to claim 1, wherein the glass fibers contain an alkali component of at least 0.8% and at most 20% in weight.

9. (Previously Presented) A hot-insulation cold-insulation apparatus comprising:

a box body;

a vacuum heat insulator applied to at least a wall part of the box body, the vacuum heat insulator including a core formed of a laminated body where glass fibers are laminated in a thickness direction of the vacuum heat insulator and an enveloping member covering the core and having gas barrier property; and

a temperature regulator for keeping temperature in the box body,

wherein the core is pressurized and molded and the glass fibers are drawn by heat deformation of the glass fibers at one of the following temperatures which are lower than the strain point of the glass fibers:

a temperature at which the glass fibers start to deform due to own weight of the glass fibers; and

a temperature at which the glass fibers become deformable due to a vertical load in pressing and sectional shapes of the glass fibers do not significantly vary, and

a shape of the core is kept by entanglement of parts of the glass fibers instead of binding of the glass fibers; and

wherein the vacuum heat insulator has a heat conductivity less than or equal to 0.0020 W/mK.

10. (Cancelled)

11. (Withdrawn) A manufacturing method of a vacuum heat insulator comprising:

laminating and arranging glass fibers in a thickness direction of the vacuum heat insulator and molding an assembly where the glass fibers are partially entangled; heating and pressing the assembly at one of the following temperatures:

a temperature at which the glass fibers start to deform due to own weight of the glass fibers; and

a temperature at which the glass fibers become deformable due to a vertical load in pressing and sectional shapes of the glass fibers do not significantly vary, and

thermally deforming the assembly into a shape at a heating and pressing time;

cooling the assembly thermally deformed in a state at the heating and pressing time to form a board-like core that keeps the shape at the heating and pressing time and has high restrictiveness and integrity in a thickness direction;

drying the core and then inserting the core into an enveloping member that is formed of bag-like laminated film having an opening; and

evaluating an inside of the enveloping member and heat-sealing the opening.

12. (Withdrawn) The manufacturing method of the vacuum heat insulator according to claim 11, wherein the glass fibers contain an alkali component of at least 0.8% and at most 20% in weight, and the heating and pressing are performed at 480°C for 5 minutes.

Remarks/Arguments:

Claims 1-3 and 5-9 are pending. Claim 10 is cancelled. The specification has been amended to correct a typographical error. On page 11, lines 6 and 7, the specification states "the vacuum heat insulators in samples E1 to E5 using no binding material have heat conductivity of 0.018 to 0.002 W/mK." As is evident in Table 1, however, heat conductivity values for samples E1 to E5 range from 0.0018 to 0.002 W/mK. As 0.018 W/mK at page 11, line 7 was merely a typographical error and should have read 0.0018 W/mK, no new matter has been added.

Claims 1-3 and 5-10 stand rejected under 35 U.S.C. § 112 as failing to comply with the enablement requirement. Applicants traverse the rejection.

The Office Action states "[t]here is no original disclosure directed to a 'strain point' as is now set for in claims 1, 9, and 10." Contrary to this assertion, however, Applicants explained previously that "distortion point" appeared in the English language National Phase application due to a translation error, and "strain point" is the correct translation of the original Japanese language PCT International Phase application. Thus, in the original Japanese filing of PCT/JP2005/001874, "strain point" was originally disclosed. The specification has been amended to correct the translation error. No new matter has been added. Withdrawal of the rejection is respectfully requested.

The Office Action further states "the original disclosure does not support the claimed range of heat conductivity less than or equal to 0.0020 W/mK." The examples in the Table and throughout the specification, however, are just that, examples merely showing embodiments of the claimed invention. "The specification need not contain an example if the invention is otherwise disclosed in such manner that one skilled in the art will be able to practice it without an undue amount of experimentation." In re Borkowski, 422 F.2d 904, 908, 164 USPQ 642, 645 (CCPA 1970). See also MPEP § 2164.02.

It is clearly explained throughout the specification that the vacuum heat insulator of the present invention has **extremely low** heat conductivity and very high heat insulation performance. See page 16, lines 14-17 of the specification. It is

explained that cores without a binding material have lower conductivity and higher insulation than cores which contain a binding material. See page 4, lines 6-15. Comparative examples containing a binding material are characterized as having high heat conductivities, *for example*, at least 0.0027 W/mK and higher. See Table 1, comparative example C1, and page 11, lines 1-5.

With particular emphasis on certain provisions of the specification, low heat conductivity is explained in the specification as follows:

> Since the binding region which conventionally works as a thermal cross-link does not exist, the number of heat transfer points between the fibers significantly decreases, and the heat transfer amount is suppressed.
>
> Page 4, lines 6-15 of the specification.
>
> In vacuum heat insulator 1, binding material made of the binder component or the component eluting from the fibers does not exist at the intersection point of fibers 5. Since the binding region which has conventionally worked as a thermal cross-link does not exist, the number of heat transfer points between the fibers decreases. The heat conduction in the thickness direction of core 2 is thus reduced, and the heat insulation performance is improved.
>
> Page 7, line 27 to page 8, line 7 of the specification.

One of ordinary skill in the art would be familiar with heat conductivity or the ability of a material to conduct or transfer heat. Thus, it is clear from the above passages that heat conduction is reduced or heat transfer is suppressed, and correspondingly heat insulation is enhanced. The specification provides examples in the range claimed which support the heat conductivity limitations in the currently pending claims. Furthermore, the specification highlights the desire for **extremely low** heat conductivity values, one of the unexpected results of the present invention. Thus, the invention is enabled as it is disclosed throughout the specification in such a manner that one skilled in the art would be able to make, use, and practice the invention without undue experimentation. There is reasonable enablement of the scope of the range, and accordingly, withdrawal of the rejection is respectfully requested.

Claims 2, 3, and 5-9 include all the features of claim 1 from which they depend, and should be allowable for the same reasons set forth above.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance which action is respectfully requested.

Respectfully submitted,

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CEB/so

Dated: January 7, 2009

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